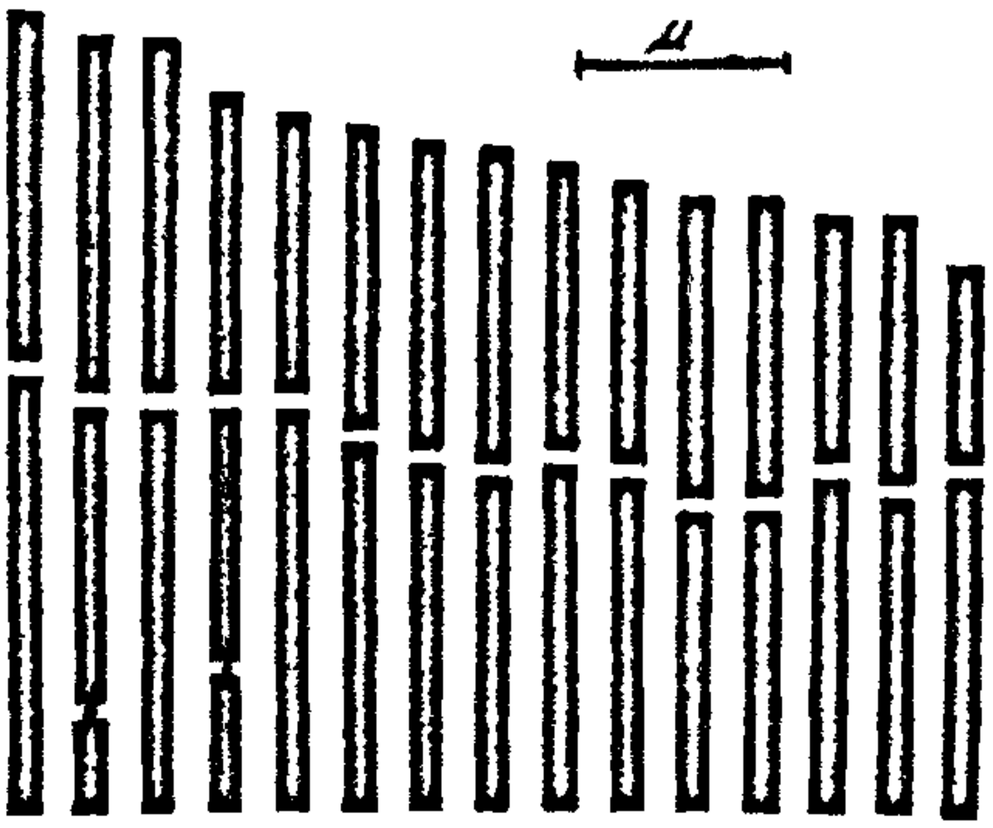

Figure 3. Idiogram of *C. lacryma-jobi* var. *ma-yuen* ($2n=30$).

The somatic chromosome number was consistently found to be $2n=30$ in the root-tip cells (figure 1). Karyotype analysis showed that the length of the chromosomes ranges from 2.66 to 3.91 μm with two pairs of M-type and 13 pairs of m-type and of 1A category[7]. Two pairs of chromosomes possess a secondary constriction in the long arm distal to the centromere (figure 3). It may be noted that the chromosomes of this taxon are similar to the other varieties of *C. lacryma-jobi* in size and karyotype category. Meiosis was found to be markedly disturbed, and at metaphase I, 3–5 quadrivalents were frequently observed along with bivalents (figure 2). Two bivalents or sometimes a single quadrivalent were found commonly associated with the nucleolus. Pollen sterility was found to be about 45%. *C. lacryma-jobi* is presumably of hybrid origin.

Financial assistance from UGC, New Delhi is gratefully acknowledged.

15 November 1988

1. Bor, N. L., *Grasses of Burma, Ceylon, India and Pakistan*, Pergamon Press, London, 1960.
2. Fedorov, A., *Chromosome Numbers of Flowering Plants*, Rept, Koenigstein, 1974.
3. Peter Goldblatt, *Index to Plant Chromosome Numbers*, Missouri Botanic Garden, 1984.
4. Christopher, J. and Thya Singh, G. E., *Curr. Sci.*, 1986, 55, 1200.
5. Christopher, J. and Mini, L. S., *J. Soc. Cytol. Genet.*, 1988, (in press).
6. Barve, S. S. and Sapre, A. B., *Curr. Sci.*, 1986, 55, 660.
7. Stebbins, G. L., *Chromosomal Evolution in Higher Plants*, Addison Wesley, London, 1971.

DIFFERENTIAL RADIATION SENSITIVITY IN MOTH BEAN

V. S. KOTHEKAR
Department of Botany, Marathwada University, Aurangabad 431 004, India.

MOTH bean, *Vigna aconitifolia* (Jacq.) Marechal, comprises one of the important pulse species of India. Being an extremely drought-resistant crop, it is grown widely in the arid and semiarid zones of Rajasthan, Gujarat, Maharashtra, Haryana and Uttar Pradesh.

Growing only 20–25 cm tall, the plant forms a mat across the soil surface. The stem of each plant radiates horizontal branches, producing an expanding circlet of densely matted, ground-hugging vegetation. A living mulch, moth bean shields soil from the sun's heat and retards soil erosion. Livestock avidly graze on its pods and foliage. The pods when young are used as a table vegetable. They contain tiny beans which are rich in proteins and other nutrients. The plant as a whole is a good source of quality forage under arid and semiarid conditions.

Although the plant has multifaceted importance, it has received only scant attention regarding its genetic improvement. Therefore it was thought worthwhile to look into the possibilities of improving moth bean through induced mutation. The present paper deals with evaluation of varietal radio-response in moth bean based on morphological parameters in R_1 and R_2 generations.

For recording the radio-response, dry seeds of three moth bean varieties, viz. Local, IPCMO 186 and MG-1, of uniform size and moisture content, were irradiated with different doses of gamma rays (5–25 kR). The irradiated seeds were sown in the field in randomized block design with three replications and the R_1 generation was raised. The effect of gamma rays on morphological parameters such as germination, survival of plants, plant height and commencement of flowering was studied. From the seed progeny of the R_1 generation, the R_2 generation

Table 1 *Relative sensitivity of moth bean varieties to gamma rays in R_1 generation*

Variety	Dose (kR)	Germination (% of control)	Survival (% of control)	Plant height (cm)	Commencement of flowering (days)
Local	Control	—	—	23.00 ± 0.10	80.00 ± 0.11
	5	103.42	103.05	27.00 ± 0.12	76.00 ± 0.15
	15	96.96	97.73	21.70 ± 0.18	82.00 ± 0.12
	25	90.72	89.36	19.25 ± 0.21	84.00 ± 0.19
IPCMO 186	Control	—	—	20.50 ± 0.15	72.00 ± 0.25
	5	101.13	101.06	22.15 ± 0.11	70.00 ± 0.22
	15	97.28	94.68	18.20 ± 0.13	74.00 ± 0.28
	25	93.27	87.23	17.05 ± 0.17	76.00 ± 0.15
MG-1	Control	—	—	23.00 ± 0.18	65.00 ± 0.35
	5	98.58	97.87	21.80 ± 0.20	66.00 ± 0.31
	15	95.86	96.72	19.75 ± 0.17	69.00 ± 0.32
	25	92.13	93.08	19.30 ± 0.15	72.00 ± 0.24

Figures in the last two columns are mean ± SE.

Table 2 *Relative sensitivity of moth bean varieties to gamma rays in R_2 generation*

Variety	Dose (kR)	Germination (% of control)	Survival (% of control)	Plant height (cm)	Commencement of flowering (days)
Local	Control	—	—	23.10 ± 0.11	80.00 ± 0.10
	5	104.50	103.00	27.23 ± 0.15	77.00 ± 0.20
	15	97.15	98.10	22.00 ± 0.21	81.00 ± 0.15
	25	91.23	90.12	20.00 ± 0.22	84.00 ± 0.11
IPCMO 186	Control	—	—	20.61 ± 0.14	72.00 ± 0.12
	5	102.00	102.00	22.75 ± 0.10	73.00 ± 0.26
	15	97.51	95.15	18.65 ± 0.14	74.00 ± 0.30
	25	94.00	88.00	17.50 ± 0.18	76.00 ± 0.15
MG-1	Control	—	—	23.05 ± 0 11	65.00 ± 0.35
	5	98.75	98.15	21.95 ± 0.19	67.00 ± 0.32
	15	96.12	97.80	20.00 ± 0.18	69.00 ± 0.30
	25	93.00	94.00	19.55 ± 0.17	71.00 ± 0.28

Figures in the last two columns are mean ± SE.

was grown. The R_2 plants were examined for effects of gamma radiation.

The results are given in tables 1 and 2. There was a general exponential fall in germination, survival and plant height with increasing gamma ray doses in both R_1 and R_2 generations. The period (days) for commencement of flowering increased with gradual increase in radiation doses. At 5 kR, a slight stimulatory effect was quite evident in varieties Local and IPCMO 186. In the case of variety MG-1, however, such a trend was not detectable.

There are several reports of differential response of varieties to radiation[1-3]. Radiosensitivity differences between varieties and species have been ascribed to moisture content of seeds[4,5], maturity and structure of embryo[6], the cell nucleus[7], the size and structure of the chromosome complement[8], and nuclear volume and ploidy level[9].

Mutagenic sensitivity is believed to be influenced by environmental and biological factors[10]. Variations of physiological conditions among individuals of the same variety have been shown to affect radiosensitivity[11]. The genetic background has been implicated in the differential mutagenic response of seeds[12]. Genetic control of intervarietal variations in mutagen sensitivity has been very well documented[13]. Varieties are believed to differ not only in their morphological characters but also in their genetic architecture, which could act as a potent factor in determining their response to mutagens[14].

The author is grateful to UGC, New Delhi, for financial assistance.

7 June 1988; Revised 25 November 1988

1. Conger, A. D. and Stevenson, H. Q., *Radiat. Bot.*, 1969, **9**, 1.
2. Prasad, A. B. and Das, A. K., *J. Cytol. Genet.*, 1980, **15**, 156.
3. Kamala, T. and Nagmani, B., *J. Cytol. Genet.*, 1980, **15**, 149.
4. Caldecot, R. S., *Radiat. Res.*, 1955, **3**, 316.
5. Emery, D. A., Boardman, E. G. and Stucker, R. E., *Radiat. Bot.*, 1970, **10**, 267.
6. Mericle, L. W. and Mericle, R. P., In: *Brookhaven Symp. Biol.*, 1961, Vol. 14, p. 262.
7. Sparrow, A. H., In: *Cellular Radiation Biology*, Baltimore, 1965, p. 199.
8. Sparrow, A. H. and Evans, H. J., In: *Brookhaven Symp. Biol.*, 1961, Vol. 14, p. 76.
9. Sparrow, A. H., Cuany, R. L., Miksche, J. P. and Schairer, L. A., *Radiat. Bot.*, 1961, **1**, 10.
10. Sparrow, A. H. and Konzak, C. F., In: *The Use of Ionising Radiations in Plant Breeding*, Camellia Cult, 1958, p. 425.
11. Ehrenberg, L., *Svensk. Kem. Tidskr.*, 1955, **67**, 207.
12. Frey, K. J., In: *Technical Meeting on the Use of Induced Mutations in Plant Breeding*, Rome, 1964, p. 465.
13. Davies, D. R., *Heredity*, 1962, **17**, 63.
14. Goud, J. V., Nayar, K. M. D. and Rao, M. G., *Indian J. Genet.*, 1970, **30**, 81.

NEUROENDOCRINE CONTROL OF PROTEIN AND AMINO ACIDS IN THE TISSUES OF FRESHWATER CRAB, *BARYTELPHUSA GUERINI* (H. MILNE EDWARDS) (DECAPODA, POTAMIDEA)

M. S. GANGOTRI†, S. A. T. VENKATACHARI* and N. VASANTHA**
Department of Zoology, New Arts, Commerce and Science College, Ahmednagar 414 001, India.
**Department of Zoology, Gulbarga University, Gulbarga 585 106, India.*
***Department of Zoology, Nizam College (Osmania University), Hyderabad 500 001, India.*

STUDIES on *Hemigrapsus nudus* showed that loss of eyestalk factor through removal of sinus gland led to acceleration of catabolic processes in the tissues[1]. Eyestalk removal led to decrease in total nitrogen content, amylolytic activity and RNA content of *Procambarus clarkii*[2] and *Barytelphusa cunicularis*[3], while eyestalk injections into eyestalk-ablated animals increased RNA levels. Histochemical studies on the hepatopancreas of *Scylla serrata* showed that glycoproteins and glycolipids were depleted following eyestalk ablation[4]. Variations in free amino acid levels in relation to eyestalk factors were also noticed in a few crustaceans[5–7]. To understand the neuroendocrine control of protein and amino acid levels in the tissues of the freshwater crab *Barytelphusa guerini*, the effects of eyestalk ablation, eyestalk injection into ablated animals, and other neuroendocrine structures were studied.

The collection and maintenance of the freshwater crab *B. guerini* were described earlier[8]. Males weighing between 30 and 50 g were used for the experiments, carried out at room temperature (26–28°C). The total protein and amino acid content of tissues like muscle, gill, heart and hepatopancreas were estimated quantitatively[9,10] in normal animals with intact eyestalks. Another group of laboratory-adapted crabs was employed for eyestalk ablation experiments. Forty-eight hours after eyestalk ablation, the animals were divided into five batches. One batch of eyestalk-ablated animals was used as control ablated animals and total protein and amino acid content were estimated. Animals in the remaining four experimental batches were given injections of extracts of eyestalks, sinus gland, brain and thoracic ganglionic mass respectively. Protein and amino acids were estimated 48 h after extract injection.

Eyestalk ablation and preparation of neuroendocrine extracts were done according to the procedures described earlier[8]. Total protein was determined[9] and the amino acids were quantified[10] by using 1 ml of 1% homogenates of tissues prepared in 0.025 M sucrose solution. At least 6 animals were used for each determination and the results were statistically analysed using Student's *t* test.

Figure 1 shows the results for total protein of muscle, gill, heart and hepatopancreas. Total protein was increased by 44.39% in muscle, 62.28% in gill and 57.32% in heart 48 h after eyestalk ablation. In each case the increase is highly significant ($P < 0.02$). Injection of eyestalk extract into eyestalk-ablated animals brought down protein content to the normal level in about 48 h. The recovery was almost complete, and the difference in protein content between animals that received eyestalk extract and

†For correspondence.